MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2015/2016

TCP2201 – OBJECT ORIENTED ANALYSIS AND DESIGN

(All groups)

3 JUNE 2016
9:00AM – 11:00AM
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 5 pages only (including this page).
2. Attempt **ALL** questions. The distribution of the marks for each question is given.
3. Print all your answers in the Answer Booklet provided.
4. State all assumptions clearly.

Question 1

a) Write a constructor and a copy constructor for a Book class. The Book class contains attributes such as title, author, ISBN, and year. You don't have to write the whole class, but only the constructor and the copy constructor. Ensure that they would not throw any kind of exceptions during runtime. [5 marks]

b) Given the code below, what is the output? Explain in detail the output produced. In case the code does not compile or it produces a runtime error, explain the error and correct the code. [5 marks]

```
public class Demo {
  public static void main(String[] args) {
    m(new GraduateStudent());
    m(new Student());
    m(new Person());
    m(new Object());
  }

  public static void m(Object x) {
    System.out.println(x.toString());
  }
}

class GraduateStudent extends Student {
}

class Student extends Person {
  public String toString() {
    return "Student";
  }
}

class Person extends Object {
  public String toString() {
    return "Person";
  }
}
```

c) The table below shows the differences between an abstract class and an interface. Complete the table so that it shows the differences from the viewpoint of variables, constructors, and methods. An example is given for you. [5 marks]

	Variables	Constructors	Methods
Abstract class			
Interface	All variables must be *public static final*		

Continued...

Question 2

a) Create a Java GUI that allows the user to enter a desired user name and password. Provide a button, when clicked, informs the user that their account was successfully created. Include labels as appropriate. [6 marks]

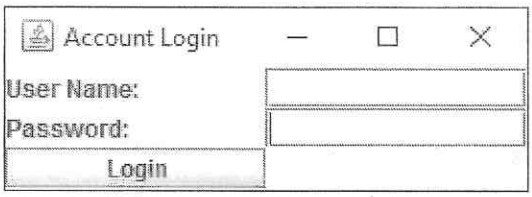

Figure 2: Example GUI

b) What are the steps involved in generating a class diagram? [3 marks]

c) Why is the Java language a simple and reliable language? And what makes it to be platform independent? [6 marks]

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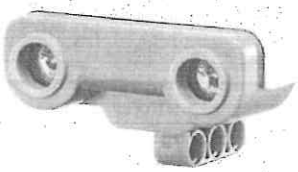
Question 3

a) What design pattern makes it so that there is only one object created for the class that implements it? [1½ marks]

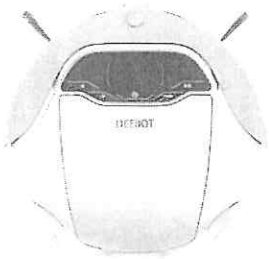
b) What design pattern defines a family of algorithms, encapsulating each one, and making them interchangeable? [1½ marks]

c) You have an existing system that already accesses some sensors using a standard interface. You have been given a new sensor to integrate into the system.



The sensor has an API, but the interface is complicated and has a lot of options, many of which you do not need for the software you are writing. Aside from that, the API does not conform to the standard interface that the existing system already uses. What design pattern should be implemented in order to fit this into your existing system? Explain why you would choose this design pattern. You are not required to provide a class diagram, but you may use one in your explanation if you want to. [6 marks]

d) You are provided with a library that contains a number of classes that will control a vacuum cleaner robot. You also have an existing piece of software that provides a user-friendly interface to control.

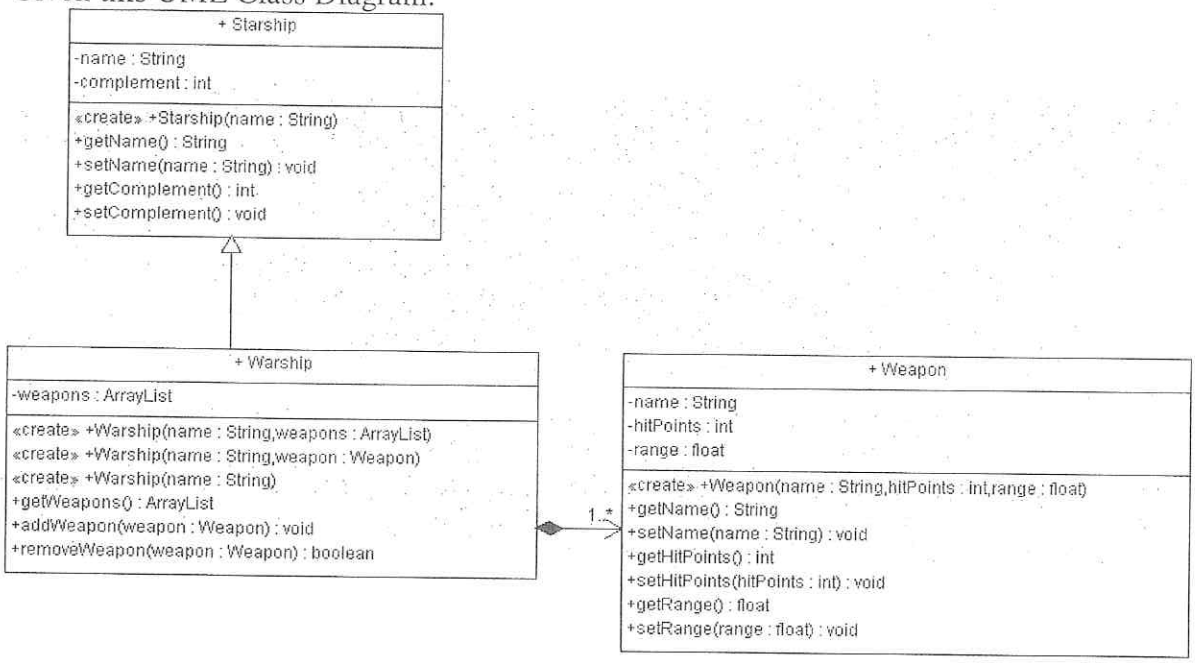


What design pattern should be implemented in order to avoid the existing system having to deal with the large number of classes provided by the vacuum cleaner robot API? Explain why you would choose this design pattern. You are not required to provide a class diagram, but you may use one in your explanation if you want to. [6 marks]

Continued...

Question 4

Given this UML Class Diagram:



a) Implement the Starship class in Java. [5 marks]

b) Implement the Weapon class in Java. [4 marks]

c) Implement the Warship class in Java. [6 marks]

Hint: be careful about the constructors, especially with the constructors in the Warship class.

End of paper